A SURVEY OF THE WALL LAKE FISH COMMUNITY, LARGEMOUTH BASS AND WALLEYE POPULATIONS AND FISH HARVEST

LaGrange County

2009

Larry A. Koza

Assistant Fisheries Biologist

Fisheries Section
Indiana Department of Natural Resources
Division of Fish and Wildlife
I.G.C.-South, Room W273
402 W. Washington Street
Indianapolis, IN 46204

2010

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ABSTRACT

Four fisheries surveys were conducted at Wall Lake by Division of Fish and Wildlife (DFW) fisheries biologists in 2009, a fish population survey, a largemouth bass population estimate, a walleye population estimate and an angler creel survey.

The fish population survey was conducted from June 15 through 18, 2009. A total of 556 fish weighing 250 pounds was collected during the general fisheries survey. Thirteen species were represented in the sample. Bluegill dominated the sample by number (38%) followed by largemouth bass (15%), redear (10%) and yellow perch (10%). Largemouth bass was the number one species collected by weight (18%), followed by spotted gar (17%), walleye (12%), and bluegill (11%).

The total largemouth bass population estimate for Wall Lake was 2,159 fish, or 15.3/acre. Of these, 2,108 (98%) were stock size, and their density was 15.0/acre. The estimated number of legal size largemouth bass in Wall Lake was 58 fish or 0.4/acre. The largest bass collected during the population estimate measured 19.1 in TL.

The total walleye population estimate for Wall Lake was 539 fish, or 3.8/acre. Legal size walleyes comprised 60.5% of the population (326 fish). In addition, 21% of the walleyes were 16 in TL or larger and 5% were 18 in TL or larger.

The creel survey was conducted from April 22 through October 31, 2009. A total of 3,339 fish weighing 1,214 pounds was harvested during this survey. Eight species were represented in the harvest. The number one species harvested numerically was bluegill (49%) followed by redear (30%), yellow perch (10%) and walleye (8%). Bluegill and redear also dominated the harvest by weight, comprising 37% and 35% of the total respectively. Boat anglers harvested 0.50 fish/h and 8.61 pounds of fish/acre. In addition to the fish harvested, anglers caught and released 3,945 largemouth bass and 443 walleyes

The average length of bluegills harvested was 7.1 in TL. Fewer than 1% of the bluegills taken measured less than 6.0 in TL. Seven and eight-in TL and larger bluegills comprised 96% and 10% of the harvest respectively. Bluegills were harvested at a rate of 0.25 fish/h and 12/acre. On average, medium size natural lakes in Indiana have yielded 0.5 bluegills/h and 23/acre. The best month for Wall Lake bluegill harvest was June (27%) followed closely by July (24%) then May (23%).

Walleyes in the harvest averaged 15.3 in TL and 82 fish weighing 98 pounds were taken. This represented approximately 25% of the total population of legal size walleye in the lake. An additional 443 walleyes were caught and released resulting in a total walleye catch of 525 fish or 0.08 per hour. Approximately 5% of the anglers at Wall Lake were targeting walleyes while an additional 10% were fishing for bass and walleyes. The group targeting only walleyes had a catch rate of 0.46 walleyes per hour.

The most popular species for Wall Lake anglers was bluegill, as 42% of all angler parties interviewed indicated they were fishing for specifically for them. Bass fisherman comprised the second most popular category with 22%.

The largest portion of Wall Lake anglers was residents of the lake (45%) while 20% hailed from Steuben County, 14% were from LaGrange County and 7.5% were from Allen County.

Wall Lake supports a good sport fish community comprised primarily of bluegills largemouth bass and redear. Together these species represented 64% of the general survey sample by number and 30% by weight. Bluegill and redear were the dominant species harvested by Wall Lake anglers also, combining to comprise 79% of the total harvest by number and 72% by weight.

There is a good aquatic vegetation community present at Wall Lake comprised of 13 native species. The lake has, however, had problems with two exotic invasive species, Eurasian watermilfoil and curly-leaf pondweed. Milfoil has been treated with herbicides and mechanical harvesting over the years and most recently a whole lake treatment using fluridone. This treatment was conducted in 2005 with financial assistance from the DFW Lake and River Enhancement Program (LARE). This treatment was successful in drastically reducing milfoil abundance. Curly-leaf pondweed emerged as a problem in 2007. Treatment of this pondweed as well as spot treatments for milfoil was conducted in 2008 and 2009 and the plants are currently under control.

INTRODUCTION

Wall Lake is a 141-acre natural lake located one mile west of Orland, Indiana in LaGrange County. It has a maximum depth of 34 feet and an average depth of 11.6 feet. The only inlet enters the lake on the southeast shore and is unnamed. The outlet flows northeast into Mud Lake and is also unnamed. Approximately 85% of the shoreline is developed with summer cottages or permanent homes. An Indiana Department of Natural Resources (IDNR) access site with a concrete boat ramp is located on the southeast shore off of County Road 565 N.

The initial fisheries survey of Wall Lake was conducted in 1969 by Division of Fish and Wildlife (DFW) biologists. The purpose of this survey was to evaluate the quality of the sport fishery. The major sport fish collected were bluegills, yellow perch and redear (Table 1). The Wall Lake fishery was considered unsatisfactory, primarily due to poor growth in the panfish population, and it was recommended that the Wall Lake fish population be totally eradicated and the lake restocked. This recommendation was not acceptable to some lake residents who sought a LaGrange County temporary injunction and restraining Court Order. This Court Order was filed September 25, 1970 but later dismissed June 2, 1971. However, the fish eradication and restocking project was never conducted. Additional DFW surveys were conducted in 1987, 2003 and 2007. In 2005 the lake association began stocking advanced fingerling walleyes in an attempt to control the stunted bluegill population as well as providing an additional sport species for anglers (Table 2). Additional walleye stockings were made by the association in 2006 and 2007, however due to funding problems no stocking occurred in 2008. DFW resumed walleye stockings in 2009 under DFW Work Plan 300FW1F10D42643 that is investigating the impact of walleye stockings on bluegill population dynamics in natural lakes. This report contains the results and analysis of a general fish population survey, largemouth bass and walleye population estimates and a creel survey conducted under the above plan. Additional survey work under this work plan involving June electrofishing sampling for bluegills, redear and largemouth bass as well as fall electrofishing for walleyes will be covered under a separate supplemental sunfish and walleye evaluation report.

METHODS

The general fish community survey was conducted on June 15 through 18, 2009. Several physical and chemical characteristics of the water were measured in the deepest area of the lake

according to the Manual of Fisheries Survey Methods (2001) standard lake survey guidelines. Submersed aquatic vegetation was sampled on July 30, 2009 using methods outlined in the Tier II Aquatic Vegetation Survey Protocol developed by the DFW Lake and River Enhancement Program and used in their aquatic vegetation control grant program. A global positioning system (GPS) device was used to record the location of the limnological data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish were collected by pulsed D.C. electrofishing the shoreline at night with two dippers for one hour. One trap net and two experimental-mesh gill nets were fished overnight for three nights. All fish collected were measured to the nearest 0.1 in TL. Length-weight regression equations for Fish Management District 2 were used to estimate the weight of all fish within the sample. Five scale samples per half-inch group were collected from game species for age and growth analysis. Average length-at-age for these species was estimated using the Fraser-Lee method of back calculation and standard intercepts (DeVries and Frie 1996, Carlander 1982).

Largemouth bass and walleye population estimates were conducted at Wall Lake in the spring of 2009. Walleye sampling was initiated on March 30 and consisted of trap netting utilizing a Lake Michigan style net. This net is much larger than the type usually used for DFW general surveys, has a longer lead and includes wings to help funnel the fish into the net. This net was fished overnight for four consecutive nights. Fish were removed from the net each morning. Beginning April 28, nighttime pulsed D.C. electrofishing was conducted consisting of five nights of sampling using two dippers. The entire shoreline was covered each night. Largemouth bass and walleyes were targeted during three of the sampling nights (6 hrs. total) while walleyes only were targeted on two of the nights (4 hrs. total). All electrofishing was conducted over a three week period. All of the bass and walleyes collected during spring sampling were measured to the nearest 0.1 in TL and marked by removing a fin. Legal and sub-legal size walleyes (legal size is 14 in TL or larger) were differentiated by removing a separate fin for each group in order to determine how many of the sub-legal size fish grew to legal size by the time they were caught during the creel survey. In addition, scale samples and dorsal spines were taken from selected fish to determine age and growth. The walleye trap net catches were pooled and treated as a single sample. The number of bass and walleyes that were re-captured during each electrofishing sample was recorded and a population estimate was made using the Schnabel method. Analysis of largemouth bass abundance concentrated on stock size fish (≥8.0

in TL) which is the main size group used for comparative purposes in scientific literature. In addition, fish smaller than stock size are often times collected in low numbers, making recapture difficult which in turn results in unreliable estimates of abundance.

The Wall Lake creel survey was conducted from April 22 through October 31, 2009. The main parameters measured during the survey included fishing pressure, fish harvest and species preference of anglers. Two fishing periods were used for this survey, a morning period and an afternoon period. The morning period began at 7:30 am and ended at 3:00 pm while the afternoon period began at 3:00 pm and ended at 10:30 pm. Angler counts were conducted four times a day and anglers were interviewed as they completed their trip. In addition, any anglers still fishing when the clerk finished his shift were interviewed and noted as partial trips. Information collected from anglers included number of hours fished, number of fish harvested by species and length of fish harvested. The number of largemouth bass and walleye caught and released by anglers was also recorded with the number of legal and sub-legal sized fish recorded separately. Additional information collected included species preference, county of residence, opinion regarding the quality of the Wall Lake fishery and how the angler believed the fishing at the lake had changed over time. The data was expanded separately by month, weekend or weekday, and boat and shore fisherman. Holidays were included with the weekend periods. Fish weights were calculated using regional length-weight regression equations.

RESULTS

The Secchi disk reading at Wall Lake was 16 ft. Dissolved oxygen concentrations at the time of the general fish community survey were adequate for fish survival down to a depth of 19 ft. A total of 50 sites were randomly sampled during the plant survey, all but two of which fell within the littoral zone in water 18 ft in depth or less. A total of 13 native and 1 exotic species was identified. Aquatic plants were observed at 46 of the 48 littoral sites sampled. The maximum number of plant species found at one site was five and the mean was two. Chara dominated the plant community, followed by slender naiad, elodea and eel grass. The single exotic, curly-leaf pondweed, was collected at only two of the sample sites. Six emergent, floating or floating leaf plants associated with wetlands including, cattails, pickerelweed, spatterdock, spike rush, three-square rush and white water lily, were also observed.

A total of 556 fish weighing 250 pounds was collected during the general fisheries survey. Thirteen species were represented in the sample. Bluegill dominated the sample by number (38%) followed by largemouth bass (15%), redear (10%) and yellow perch (10%). Largemouth bass was the number one species collected by weight (18%), followed by spotted gar (17%), walleye (12%), and bluegill (11%).

Bluegill ranked first among all species collected by number (38%) and fourth by weight (11%). They ranged in length from 1.5 (age 1) to 8.9 (age 9) in TL and averaged 4.4 in TL. A total of 212 bluegills weighing 29 pounds was collected. The electrofishing catch rate for bluegills was 154 fish/h. Gill netting yielded only one bluegill/lift and trap nets caught 18 bluegills/lift. Harvestable size bluegills (6 in TL or larger) comprised 29% of the sample, reaching this size during their fourth year (Table 3). Approximately 25% were 7.0 in TL or larger and 17% were 8.0 in TL or larger. Age-1 through age-9 bluegills were present in the survey sample. Of these, age-2 through age-5 fish grew at a below average rate for northern Indiana natural lakes while all other ages of fish grew at an average rate. Approximately 47% percent of the bluegills collected in 2007 were harvestable size, as well as 17% in 2003 and 31% in 1987. Bluegills 7-in TL and larger comprised 31%, 9% and 6% of the sample in the 2007, 2003 and 1987 surveys respectively. Eight-in TL or larger bluegills have been scarce in previous surveys with only 12 collected in 2007, 4 in 2003 and none in the older surveys.

Largemouth bass was the dominant species by weight as a total of 86 weighing 45 pounds was collected during this survey. They ranged in length from 3.3 (age 1) to 15.3 (age 7) in TL and averaged 9.5 in TL. Legal size bass, those fourteen in TL or larger, comprised 1% of the bass sample. The electrofishing catch rate for largemouth bass was 75 fish/h. Gill netting yielded two bass/lift while no bass were captured during trap netting. Age-1 through age-7 bass were collected during this survey. Of these age groups, age-2 largemouth bass grew at an average rate for northern Indiana natural lakes while all other ages of bass grew at a below average rate. In previous Wall Lake surveys, collections of largemouth bass fourteen in TL or larger consisted of 10 fish in 1987 and 3 fish in each of the other surveys.

A total of 58 redear weighing 23 pounds was collected during this survey. Redear were third in abundance by number and seventh by weight among all species. They ranged in length from 3.7 (age 2) to 9.6 (age 7) in TL and averaged 7.7 in TL. Harvestable size redear (6 in TL or larger) comprised 88% of the sample. In addition, approximately 74% were 8 in TL or larger

and 12% were 9 in TL or larger. The electrofishing catch rate for redear was 14 fish/h. There were no redear collected during gill netting, however trap netting yielded 14 redear/lift. Age-2 as well as age-4 through age-9 fish were represented in the sample. All ages of redear grew at an average rate for northern Indiana natural lakes. A high of 420 redear was collected in 1987 but this number dropped to 248 in 2003 and 71 in 2007. Approximately 70% of the 1987 sample consisted of harvestable size fish and this number increased to 86% by 2007

Yellow perch comprised 10% of the total sample by number (4^{th}) and 3% by weight (9^{th}). They ranged in length from 2.8 (age 1) to 10.0 (age 6) in TL and averaged 5.4 in TL. Approximately 19% of the 57 perch in the sample measured 8 in TL or larger, considered harvestable size, while 5% were 9 in TL or larger. The electrofishing catch rate for perch was 34 fish/h. Trap nets captured one perch/lift while 3/lift were caught during gill netting. All ages of perch grew at an average rate for northern Indiana natural lakes. The collection of perch in previous surveys ranged from a high of128 fish in 1969 to a low of 13 in 2003. Harvestable size perch at Wall Lake have historically been present in low numbers.

A total of 29 walleyes ranging in length from 12.1 (age 2) to 18.9 (age 4) in TL was collected during the general survey. They weighed 31 pounds, which was the third highest total weight among all species, and averaged 14.3 in TL. Approximately 55% were legal size fish (14 in TL or larger) while 17% measured 16 in TL or larger and 10% were 18 in TL or larger. Age-2, age-3 and age-4 walleye were present in the sample which coincided with the three stockings made by the lake association.

Additional sport species collected included 14 rock bass, the largest of which measured 8.7 in TL and one northern pike which measured 26.4 in TL.

The total largemouth bass population estimate for Wall Lake was 2,159 fish, or 15.3/acre. Of these, 2,108 (98%) were stock size and their density was 15.0 fish/acre. Bass 8.0 to 12.0 in TL comprised 76% of the electrofishing sample. Twenty-two of the bass collected (3%) measured 14 in TL or larger which is legal size. Only seven of the bass were 16 in TL or larger and only two were 18 in TL or larger. The estimated number of legal size largemouth bass in Wall Lake was 58 fish or 0.4/acre (Table 16). The largest bass collected during the Wall Lake population estimate study measured 19.1 in TL. A total of 821 bass, or 38% of the population, was handled during this survey.

The total walleye population estimate for Wall Lake was 539 fish, or 3.8/acre. Legal size walleyes comprised 60.5% of the population (326 fish). In addition, 21% of the walleyes were 16 in TL or larger and 5% were 18 in TL or larger. The largest walleye collected during spring sampling was a 22.5 in TL fish taken during trap netting.

A total of 322 parties consisting of 554 anglers was interviewed at Wall Lake during the creel survey. Of these, 316 parties (98%) were fishing from a boat. Due to the small number of shore anglers that were interviewed, the resultant estimates for the fish harvest by these anglers were unrealistically high. Therefore, only the results from boat fisherman will be used in the discussion of the survey results.

A total of 3,339 fish weighing 1,214 pounds was harvested during the Wall Lake creel survey (Table 4). Eight species were represented in the harvest. The number one species harvested numerically was bluegill (49%) followed by redear (30%), yellow perch (10%) and walleye (8%). Bluegill and redear also dominated the harvest by weight, comprising 37% and 35% of the total respectively. Boat anglers harvested 0.50 fish/h and 8.61 pounds of fish/acre. In addition to the species harvested, anglers caught and released 3,945 largemouth bass and 443 walleye. Legal size fish comprised approximately 4% and 29% of the bass and walleye caught and released respectively (Table 5).

The highest fish harvest at Wall Lake occurred in June (33%), followed by May (27%) and July (23%) (Table 6). The combined harvest for these three months was 2,759 fish which was 83% of the total fish taken. The highest number of fish harvested per hour occurred in April (0.83) followed by May (0.63) and June (0.59). The lowest harvest by number occurred in October (119) while the lowest number of fish taken per hour (0.21) was in September.

Total fishing pressure by boat anglers for the Wall Lake survey was 6,712 hours or 48 hours/acre. June and July dominated in this category as 51% of the fishing pressure (3,403 hours) occurred during these two months. The next highest fishing pressure was exerted during May (1,402 hours), followed by September (899 hours). The least amount of fishing pressure for a complete month occurred during October (327 hours) followed by August (511 hours). The hours fished during these two months comprised only 5% and 8% of the total fishing pressure for the survey respectively. The average trip length for boat anglers at Wall Lake was 2.9 hours.

Bluegill was the dominant fish taken during the creel survey, both by number (49%) and weight (37%), ranking first in both categories. A total of 1,648 bluegills was harvested by Wall

Lake anglers, weighing 451 pounds and ranging in length from 5.5 to 9.5 in TL (Table 7). The average length of bluegills harvested was 7.1 in TL. Fewer than 1% of the bluegills taken measured less than 6.0 in TL, which is considered harvestable size. Seven and eight-in TL and larger bluegills comprised 96% and 10% of the harvest respectively. Only seven bluegills were harvested that measured 9.0 in TL or larger. Approximately 77% of the bluegills harvested were in the 7.0 in TL half-inch group. Bluegills were harvested at a rate of 0.25 fish/h and 12/acre. On average, medium size natural lakes in Indiana have yielded 0.5 bluegills/h and 23/acre. This is based on the results of creel surveys conducted at 19 medium sized natural lakes in Indiana over the last 30 years. Approximately 12% of the bluegills harvested during that time period were less than 6.0 in TL while 13% were 8.0 in TL or larger. The best month for Wall Lake bluegill harvest was June (27%) followed closely by July (24%) then May (23%). The lowest bluegill harvest occurred in August (4%) followed by October (6%).

A total of 1,004 redear weighing 420 pounds was taken by Wall Lake anglers. Redear ranked second numerically (30%) and by weight (35%) among species in the harvest. They ranged in length from 6.0 in TL to 10.0 in TL and averaged 8.2 in TL (Table 8). Approximately 77% of the redear harvested were 8.0 in TL or larger while 20% were 9.0 in TL or larger. Redear harvest was highest in June, when approximately 50% of the fish were taken, followed by May with 39%. The estimated redear harvest occurred in August, September and October was zero. Redear were harvested at a rate of 0.15 fish/h and 7/acre.

Yellow perch contributed 441 fish to the Wall Lake harvest ranking third by number. They ranged in length from 5.5 to 12.0 in TL and averaged 8.0 in TL while weighing 120 pounds (Table 9). Harvestable size perch (8.0 in TL and larger) comprised 66% of the catch while 7% of the fish were 10 in TL or larger. July was the dominant month for perch as 57% of them were harvested during this month. No perch were taken during April or September. Yellow perch were harvested at a rate of 0.07 fish/h and 3/acre.

Walleyes ranged in length from 14.0 in TL to 17.0 in TL and averaged 15.3 in TL (Table 10). Wall Lake anglers harvested 82 walleyes weighing 98 pounds during this survey, ranking them fourth both numerically (2.5%) and by weight (8%). All of the walleyes harvested were 14 in TL or larger, which is legal size, while 55% measured 15 in TL or larger and 50% measured 16 in TL or larger. This represents a removal of approximately 25% of the estimated population of legal size walleyes in Wall Lake, 22% of the fish 15 in TL or larger and 36% of those 16 in

TL and larger. May was the top month for walleye harvest as 52% were taken during this month. The second best month for walleyes was June when 29% were harvested. There were no walleyes harvested in April, August or September. Walleyes were harvested at a rate of 0.01 fish/h and 0.6/acre. On a weight basis, 0.69 pounds of walleyes per acre were harvested. An additional 443 walleyes were caught and released by Wall Lake anglers. Of these, 128 were legal size fish while 315 were sub-legal size. The total walleye catch was 525 fish or 0.08 per hour. The best months for walleye catch were also May (213 fish) and June (205 fish) as approximately 80% of the total walleye catch occurred during these two months. Approximately 5% of the anglers at Wall Lake were targeting walleyes while an additional 10% were fishing for bass and walleyes. The group targeting only walleyes had a catch rate of 0.46 walleyes per hour. According to DFW criteria, a walleye fishery is considered successful in Indiana if the yield is 1 pound/acre, the harvest is 1 fish/acre, or if there is a minimum angler preference of 5% with a minimum catch rate of 0.10 walleyes/hour for anglers targeting walleyes.

Black crappies comprised 2% of the total fish harvest by number and 3% by weight. A total of 58 crappies ranging in length from 7.5 to 12.5 in TL and weighing 33 pounds was taken by anglers (Table 11). Black crappies 10.0 in TL or larger comprised 55% of the harvest while fish 12.0 in TL or larger comprised 28%. The average length of crappies harvested was 10.0 in TL while the average weight was 0.57 pounds. Crappie harvest was highest in the month of June (59%) with July ranking second (21%). There were no crappies harvested in either May or October. Black crappies were harvested at a rate of 0.01 fish/h and 0.4/acre.

Only 26 largemouth bass were harvested at Wall Lake during this creel survey. They ranged in length from 13.0 in TL to 17.0 in TL and averaged 15.2 in TL (Table 12). Four of the bass harvested measured less than 14 in TL which is the legal size for largemouth bass. Bass harvest occurred at a rate of 0.18 fish/acre and 0.01/h. The catch and release of largemouth bass during the survey totaled 3,945 fish or 28 per acre. Combined with bass harvest, this resulted in an overall catch of 3,971 bass at Wall Lake at a rate of 28 bass/acre or 0.59 bass/h. The average bass catch from seven medium sized Indiana natural lakes since the imposition of a 14 in TL minimum size limit in 1998 was 23 fish/acre and 0.42 fish/h. The highest largemouth bass catch occurred in June (998 fish) followed closely by July (988 fish). Combined, these two months accounted for 50% of the largemouth bass catch at Wall Lake. The lowest bass catch over the course of a full month occurred in October when only 129 bass (3%) were caught followed by

August with 347 fish (9%). Largemouth bass catch/h ranged from a high of 0.86/h in September to a low of 0.39/h in October and averaged 0.59 bass/h.

There were two other species in the harvest for the Wall Lake Creel, bullheads and rock bass. Together these species comprised approximately 2% of the total harvest by number and 4% by weight (Table 13).

The most popular fish for Wall Lake anglers were bluegills, as 42% of all angler parties interviewed indicated they were fishing specifically for bluegills (Table 14). Bass fisherman comprised the second most popular category with 22% while 15% indicated they were fishing for "anything". Other significant responses included bass and walleyes (10%) and walleyes (5%).

Residents from eight Indiana counties outside of LaGrange County, as well as the states of Michigan and Ohio and one other undetermined state, fished at Wall Lake during this survey (Table 15). The largest portion of Wall Lake anglers were residents of the lake (45%) while 20% hailed from Steuben County, 14% were from LaGrange County and 7.5% were from Allen County.

Anglers were asked to rate the quality of fishing for the species they were seeking that day at Wall Lake. Approximately 89% responded that they thought fishing for their species was good and only 4% rated it as poor. They were also asked if fishing at Wall Lake was improving, declining or staying the same. Approximately 85% responded that they thought fishing was improving while roughly 6% indicated they thought fishing was declining.

DISCUSSION

Wall Lake supports a good sport fish community comprised primarily of bluegills largemouth bass and redear. Together these species represented 64% of the general survey sample by number and 30% by weight. Bluegills and redear were the dominant species harvested by Wall Lake anglers also, combining to comprise 79% of the total harvest by number and 72% by weight. Yellow perch contributed 441 fish (13%) to the harvest.

A total of 322 fishing parties fished for 6,712 hours and harvested 3,339 fish weighing 1,211 pounds during the creel survey. Anglers averaged 47.6 hours of fishing pressure per acre while harvesting 0.50 fish/h. Averages from medium size natural lake creel surveys in Indiana are 50.6 hours of fishing pressure per acre and a harvest rate of 0.69 fish/h. This means that

Wall Lake anglers fished 6% fewer hours per acre than the average while harvesting 27% fewer fish/h. Despite the lower numbers, anglers at Wall Lake are satisfied with the fishery as 89% responded that they thought fishing for their species was good and 85% thought fishing was improving at the lake.

Bluegill was the dominant species by number in both the general survey (38%) and the creel survey (49%). There were 212 bluegills collected during the general survey and 1,648 harvested during the creel survey. The percentage of 6 and 7 in TL and larger bluegills collected from Wall Lake in general fisheries surveys has varied over the years. After seeing increases in 2007, the percents fell somewhat in the current survey but still are higher than the average from the pre-2007 surveys. In addition, the percentage of 8 in TL or larger bluegills increased to almost three times the 2007 percentage.

Wall Lake anglers had a high preference for bluegill as this species was sought by 42% of those interviewed. Angler success was marginal as 1,648 bluegills were harvested at a rate of 12/acre and 0.25/h. Both rates were approximately half of the Indiana medium natural lakes average of 25/acre and 0.49/h. In addition, the harvest of 8 in TL or larger bluegills comprised 10% of the total which is less than half of the natural lakes average of 24%. The majority of the age classes for bluegills grew at a below average rate for northern Indiana natural lakes.

Redear were third in abundance (10%) among species collected during the general survey and ranked second by number (30%) in the creel harvest. The number of redear in the general fish population surveys has steadily declined as evidenced by the collection of only 58 fish in the current general survey compared to 420 in 1987, 248 in 2003 and 71 in 2007. However, over 1,000 redear were taken by Wall Lake anglers during the creel survey. With 77% of these fish measuring 8 in TL or larger and 20% being 9 in TL or larger they are certainly attractive to anglers. The reason the creel harvest has not been reflected in the general survey collections is unknown.

Yellow perch were a solid contributor to the angler harvest as they ranked third by number. With 66% of the perch harvested being 8 in TL or larger and 7% being 10 in TL or larger they provided anglers with additional fishing opportunities.

The walleye fishery at Wall Lake has begun to develop as more of the stocked fish have entered the legal size range. There were only three year classes of walleyes present in Wall Lake for the majority of the creel with the oldest of these being age-4 fish. The total harvest of

walleyes at Wall Lake consisted of only 82 fish, or 25% of the estimated population of legal size walleye in the lake. However, it is estimated an additional 443 were caught and released. There was good interest from anglers as approximately 5% were fishing specifically for walleyes and an additional 10% were fishing for bass and walleyes. The 5% angler preference, coupled with a catch rate of 0.46 walleyes/h by this group means Wall Lake satisfied one of the criteria established by the DFW for determining if a walleye fishery in Indiana is successful. Although the harvest requirements of one fish or one pound per acre were not met, the progress being shown by this fishery is encouraging.

Largemouth bass are popular with Wall Lake anglers as 22% of the parties targeted them. Bass catch rates were slightly above average at 28 fish/ac compared to the average of 23/ac and 0.59 bass/h compared to 0.42/h on average. Despite good catch rates, only 26 largemouth bass were harvested and 4 of these were smaller than legal size. At Wall Lake, anglers caught and released 3,945 bass. However, only 4% of these were estimated to be legal size fish. Furthermore, the bass population estimate revealed that legal size bass were present at a level of only 0.41 fish/ac. The average for legal size bass density on medium size natural lakes in Indiana is 3.5 fish/ac. The number of stock size bass at Wall Lake was estimated at 15/ac, also lower than the natural lakes average of 21/ac. Therefore the average percentage of stock size bass that are also legal size for medium size natural lakes in Indiana is 16.7%. At Wall Lake that number during the currently survey is 2.7%. Wall Lake not only has a smaller than average bass population but also has a shortage of legal size fish in the population. Only one legal size bass was collected during the general survey. In fact, very few legal size bass have been collected in previous general surveys at the lake. An examination of the growth patterns of bass at Wall Lake revealed only age-2 bass grew at an average rate, all other rates were below average. Typically, slow growth in bass populations is attributed to an overabundance of bass in the lake to the point that the forage base cannot support the population. This may also be exacerbated in situations where vegetation abundance restricts access to the prey base due to providing more hiding places to allow predator avoidance. At Wall Lake, however, bass have historically grown at a slow rate dating back to the 1987 survey where bluegills were extremely abundant. This was also prior to Eurasian watermilfoil becoming a problem in the lake, a species often related to the problematic increase in vegetative cover. Additional investigation of the bass population will continue as part of the sampling at Wall Lake under the current walleye work plan.

Wall Lake supports a good aquatic vegetation community comprised of 13 native species. The lake has, however, had problems with two exotic invasive species, Eurasian watermilfoil and curly-leaf pondweed. Milfoil abundance began to be an issue in the late 1990's and after a period of time battling this plant with contact herbicides and even trying mechanical harvesting, the residents decided to contract a whole lake treatment using fluridone. This treatment was conducted in 2005 with financial assistance from the DFW Lake and River Enhancement Program (LARE). This treatment was successful in drastically reducing milfoil abundance. Unfortunately, curly-leaf pondweed emerged as a problem in 2007. Treatment of this pondweed as well as spot treatments for milfoil were conducted in 2008 and 2009, again with the help of LARE grants. In 2009, there was no milfoil collected during plant sampling at Wall Lake and curly-leaf pondweed was present at only two sample sites. Monitoring will continue to track the abundance of these two plants.

No fish diseases or parasites were observed during this survey. Shoreline erosion is minimal.

RECOMMENDATIONS

- Walleye stockings should continue at Wall Lake as a necessary component in the ongoing investigation by the DFW into the impact of walleye stockings on bluegill populations in natural lake.

- Largemouth bass growth, density and population structure should continue to be evaluated as outlined in DFW Work Plan 300FW1F10D42643.

- Wall Lake residents should continue with their efforts to control the Eurasian watermilfoil and curly-leaf pondweed populations in the lake. Additional funding should be sought through the LARE program to assist with these efforts.

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Submitted by: Larry A. Koza, Assistant Fisheries Biologist
Date: 11/910

Approved by: Stuart Shipman
North Region Fisheries Supervisor
Date: 11/10/10

Table 1. Sampling effort, species composition and relative abundance of fish collected during 1969, 1987, 2003, 2007 and 2009 fisheries surveys of Wall Lake.

Species	1969	1987	2003	2007	2009
Black crappie		26	17	1	
Bluegill	493	709	547	195	212
Bluntnose minnow			2		
Bowfin	8	3	1	3	
Brook silverside	present	present	present	present	present
Brown bullhead	29	74	38	40	35
Common carp	1				
Golden shiner	8	13			
Green sunfish		2	9	3	4
Hybrid sunfish		49			
Lake chubsucker	57	7			
Largemouth bass	29	67	98	105	86
Northern pike	6	2	9	1	1
Pumpkinseed	9	28	2		
Redear	58	420	248	71	58
Redfin pickerel	18	14	2	1	
Rock bass			3	8	14
Spotted gar	7	55	7	9	20
Walleye				24	29
Warmouth	9	47	13	53	11
Yellow bullhead	52	49	13	53	29
Yellow perch	128	69	13	22	57
Total	912	1,634	1,024	544	556
Sampling Effort					
Electrofishing Effort	2.0 h AC	1.0 h AC	1.0 h DC	0.75 h DC	1.0 h DC
Gill Net Effort	8 lifts	9 lifts	6 lifts	4 lifts	6 lifts
Trap Net Effort	4 lifts	6 lifts	3 lifts	4 lifts	3 lifts

Table 2. Wall Lake walleye stockings 2005 through 2009.

Date Stocked	# Stocked	Size (inches)
10/15/05	1,400	5.0-7.0
10/3/06	1,400	5.0-8.0
10/17/07	1,400	6.0-8.0
2008	None	
10/8/09	1,410	7.4-9.6

Note: 2005-07 fish were purchased by the Wall Lake Fisherman's Association.

Table 3. Catch by select size ranges for bluegills and largemouth bass collected during 1969, 1987, 2003, 2007 and 2009 fisheries surveys of Wall Lake.

Species	Length Range (TL)	1969	1987	2003	2007	2009
Bluegill	3.0-5.5 in	445	444	347	94	98
	6.0-6.5 in	35	175	45	32	8
	7.0-7.5 in	2	44	44	48	16
	$\geq$ 8.0 in	0	0	4	12	37
Largemouth bass	8.0-9.5 in	17	29	26	28	20
	10.0-11.5 in	4	6	32	47	48
	12.0-13.5 in	1	7	14	13	3
	14.0-17.5 in	1	10	3	2	1
	$\geq$ 18.0 in	2	0	0	1	0

Table 4. Fishing pressure, harvest and yield from Wall Lake, April – October, 2009.

Species	Number Harvested	Percent	Total Weight (lbs.)	Percent
Bluegill	1,648	49.4	451.46	37.2
Redear	1,004	30.1	419.95	34.6
Yellow perch	441	13.2	120.47	9.9
Walleye	82	2.5	97.69	8.0
Black crappie	58	1.8	33.19	2.7
Bullhead	56	1.7	37.34	3.1
Largemouth bass	26	0.8	47.10	3.9
Rock bass	24	0.7	6.73	0.6
Total	3,339		1,213.93	

Total angler hours – 6,711.95
Total angler hours per acre – 47.60
Total pounds harvested per acre – 8.61
Fish harvested per hour – 0.50
*less than 0.1%

Table 5. Number of legal and sub-legal size largemouth bass and walleyes caught and released at Wall Lake, 2009.

Species	Number	Percent (by species)
Largemouth bass (sub-legal)	3,802	96.4
Largemouth bass (legal)	143	3.6
Largemouth bass (total)	3,945	
Walleye (sub-legal)	315	71.1
Walleye (legal)	128	28.9
Walleye (total)	443	
Total	4,388	

Table 6. Monthly fishing pressure and harvest from Wall Lake, April – October, 2009.

Species	April	May	June	July	August	September	October	Total
Bluegill	98	377	449	394	59	179	92	1,648
Redear	40	391	506	67	0	0	0	1,004
Yellow perch	0	40	81	250	52	0	18	441
Walleye	0	43	24	6	0	0	9	82
Crappie	2	0	34	12	5	5	0	58
Bullhead	0	25	5	21	5	0	0	56
Largemouth bass	2	7	5	12	0	0	0	26
Rock bass	0	5	5	0	5	9	0	24
Total	142	888	1,109	762	126	193	119	3,339
Angler hours	170.40	1,402.40	1,888.0	1,514.55	510.80	898.80	327.00	6,711.95
Hours per acre	1.27	11.28	13.56	10.74	3.74	6.49	2.32	47.60
Fish per hour	0.83	0.63	0.59	0.50	0.25	0.21	0.36	0.50

Table 7. Length-frequency distribution for bluegills harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
5.5	7	0.4	0.86	0.2
6.0	17	1.0	2.72	0.6
6.5	48	2.9	9.81	2.2
7.0	1,276	77.4	327.24	72.5
7.5	140	8.5	44.37	9.8
8.0	110	6.7	42.49	9.4
8.5	43	2.6	20.01	4.4
9.0	6	0.4	3.33	0.7
9.5	1	0.1	0.65	0.1
Total	1,648		451.46	

*less than 0.1%

Table 8. Length-frequency distribution for redear harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
6.0	4	0.4	0.64	0.2
6.5	17	1.7	3.45	0.8
7.0	67	6.7	17.00	4.0
7.5	139	13.8	43.39	10.3
8.0	302	30.1	114.45	27.3
8.5	273	27.2	124.12	29.6
9.0	134	13.3	72.34	17.2
9.5	55	5.5	34.93	8.3
10.0	13	1.3	9.63	2.3
Total	1,004		419.95	

Table 9. Length-frequency distribution for yellow perch harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
5.5	10	2.3	0.76	0.6
6.0	10	2.3	1.01	0.8
6.5	5	1.1	0.65	0.5
7.0	52	11.8	8.60	7.1
7.5	73	16.6	15.08	12.5
8.0	131	29.7	33.32	27.7
8.5	88	20.0	27.20	22.6
9.0	36	8.2	13.38	11.1
9.5	5	1.1	2.21	1.8
10.0	26	5.9	13.56	11.3
12.0	5	1.1	4.69	3.9
Total	441		120.47	

Table 10. Length-frequency distribution for walleyes harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
14.0	29	35.4	25.93	26.5
14.5	8	9.8	7.96	8.1
15.0	4	4.9	4.41	4.5
16.0	21	25.6	28.2	28.9
16.5	8	9.8	11.8	12.1
17.0	12	14.6	19.38	19.8
Total	82		97.69	

Table 11. Length-frequency distribution for black crappies harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
7.5	5	8.6	1.12	3.4
8.0	5	8.6	1.36	4.1
8.5	5	8.6	1.64	4.9
9.0	11	19.0	4.27	12.9
10.0	11	19.0	5.87	17.7
11.0	5	8.6	3.55	10.7
12.0	11	19.0	10.16	30.6
12.5	5	8.6	5.22	15.7
Total	58		33.19	

Table 12. Length-frequency distribution for largemouth bass harvested from Wall Lake, 2009.

Total Length (in.)	Number Harvested	Percent	Total Weight (lbs.)	Percent
13.0	4	15.4	4.37	9.3
14.0	4	15.4	5.48	11.6
15.0	4	15.4	6.76	14.4
16.0	10	38.5	20.59	43.7
17.0	4	15.4	9.91	21.0
Total	26		47.10	

Table 13. Species, number and weight of additional fish harvested from Wall Lake, 2009.

Species	Number Harvested	Total Weight (lbs.)
Rock bass	24	6.73
Bullhead	56	37.34
Total	80	44.07

Table 14. Species preference of angling parties interviewed at Wall Lake, 2009.

Species	Number of Parties	Percent
Bluegill	134	41.7
Bass	71	22.1
Anything	47	14.6
Bass and Walleye	32	10.0
Walleye	17	5.3
Crappie	12	3.7
Yellow perch	4	1.3
Crappie and Yellow perch	3	0.9
Northern pike	1	0.3
Total	321	

Table 15. County of residence of angling parties interviewed at Wall Lake, 2009.

County	Number of Parties	Percent
Lake Resident	145	45.0
Steuben	63	19.6
LaGrange	45	14.0
Allen	24	7.5
Ohio	16	5.0
Michigan	11	3.4
Elkhart	7	2.2
DeKalb	5	1.6
Noble	2	0.6
Madison	1	0.3
Marion	1	0.3
St. Joseph	1	0.3
Other state	1	0.3
Total	322	

Table 16. Average number of largemouth bass per acre in medium size natural lakes (100-499 acres) in Indiana prior to and following the imposition of a 14" minimum size limit. Number of lake populations included in the average in ().

Size range (inches)	Average pre-size limit (21)	Average post-size limit (7)	Wall Lake 2009
$\geq$ 8.0 in	11.4	20.8	15.0
$\geq$ 12.0 in	3.1	8.8	3.5
$\geq$ 14.0 in	1.7	3.5	0.4

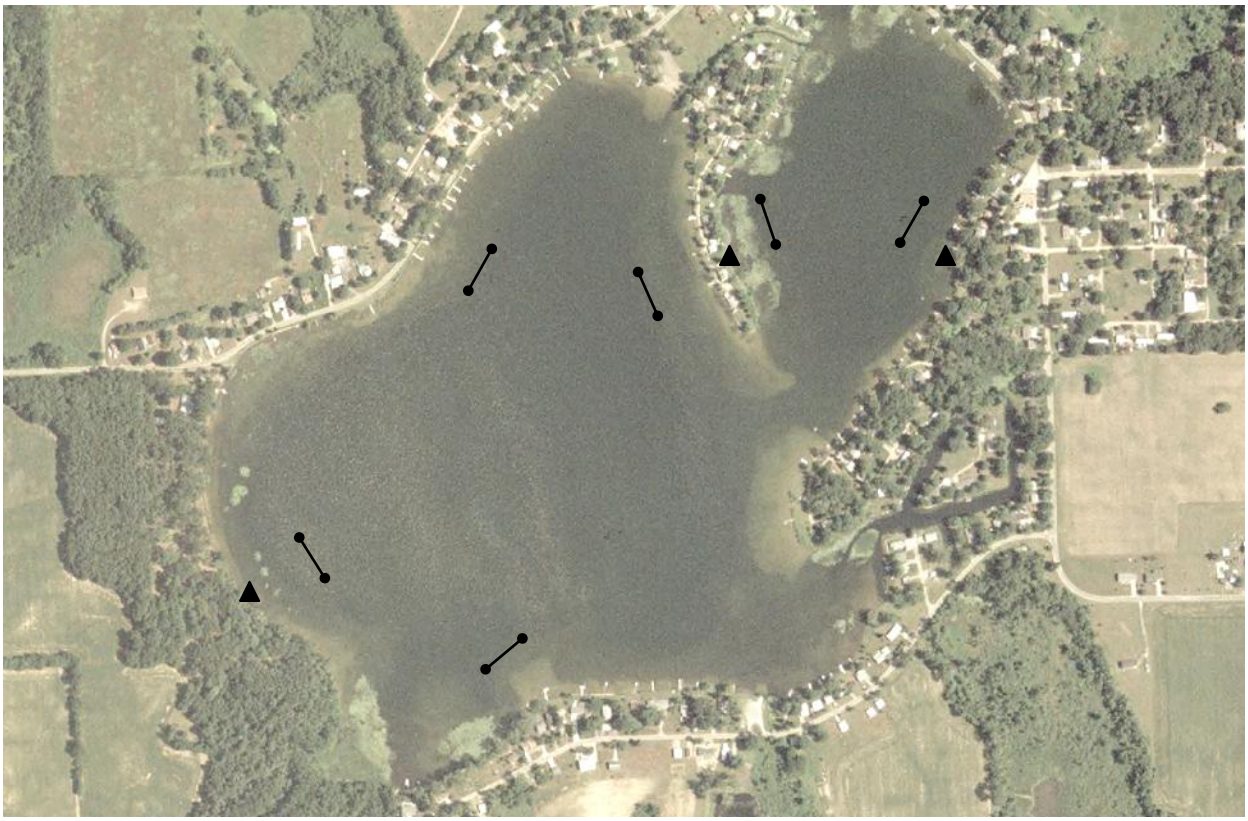

Figure 1. Aerial photo of Wall Lake with sample locations.

APPENDIX 1. General survey data page

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [X] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Wall	LaGrange	June 15-18, 2009
Biologist's name		**Date of approval (Month, day, year)**
Neil D. Ledet and Larry A. Koza		November 10, 2010

LOCATION

Quadrangle Name	Range	Section
Orland	11D	24 & 25
Township Name	**Nearest Town**	
38N	Orland, Indiana	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
South end of lake off of 565 N	None	None

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
141	34 feet	11.6 feet	1,640	942 MSL	None

Location of benchmark: 4 feet north of the outlet pipe.

INLETS

Name	Location	Origin
Unnamed ditch	Southeast	

OUTLETS

Name	Location
Unnamed ditch	Northeast, flows to Mud Lake

Water level control: 24 inch steel pipe

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

- [ ] Boulder
- [ ] Gravel
- [X] Sand
- [ ] Muck
- [ ] Clay
- [X] Marl

Watershed use: General farming, residential

Development of shoreline: Completely developed except western shore (85%).

Previous surveys and investigations: U.S.G.S. Hydrographic Survey 1957. IDNR Fisheries Surveys: Hudson, 1969; Ledet, 1987; Koza, 2003, 2007.

SAMPLING EFFORT					
ELECTROFISHING	Day hours: 0		Night hours: 1.0		Total hours: 1.0
TRAP NETS	Number of traps: 1		Number of Lifts: 3		Total effort: 3
GILL NETS	Number of nets: 2		Number of Lifts: 3		Total effort: 6
ROTENONE	Gallons:	ppm:	Acre Feet Treated:	SHORELINE SEINING	Number of 100 Foot Seine Hauls:

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color: Light Green	Turbidity: 16 Feet 0 Inches (SECCHI DISK)
Alkalinity (ppm)*: Surface: 120.1 Bottom: 120.1	pH: Surface: 9.2 Bottom: 9.0
Conductivity: 290 micromhos	Air temperature: 70 °F
Water chemistry GPS coordinates: N 41.72829	W 85.20406

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	73.2	9.0	36			72		
2	73.1	9.1	38			74		
4	73.0	9.1	40			76		
6	72.1	9.3	42			78		
8	71.5	9.1	44			80		
10	71.0	8.9	46			82		
12	70.0	8.4	48			84		
14	68.1	8.2	50			86		
16	63.8	7.6	52			88		
18	59.9	5.7	54			90		
20	56.9	1.8	56			92		
22	54.1	1.1	58			94		
24	52.4	0.7	60			96		
26	50.8	0.3	62			98		
28	50.3	0.3	64			100		
30	49.7	0.2	66					
32	49.7	0.2	68					
34			70					

COMMENTS

*ppm-parts per million

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	212	38.1	1.5 - 8.9	28.65	11.4
Largemouth bass	86	15.5	3.3 - 15.3	44.73	17.9
Redear	58	10.4	3.7 - 9.6	22.51	9.0
Yellow perch	57	10.3	2.8 - 10.0	7.10	2.8
Brown bullhead	35	6.3	8.6 - 13.2	26.29	10.5
Walleye	29	5.2	12.1 - 18.9	30.83	12.3
Yellow bullhead	29	5.2	7.4 - 13.1	15.94	6.4
Spotted gar	20	3.6	18.3 - 32.5	43.32	17.3
Rock bass	14	2.5	2.6 - 8.7	2.43	1.0
Warmouth	11	2.0	4.5 - 7.5	1.83	0.7
Green sunfish	4	0.7	3.1 - 6.0	0.25	0.1
Northern pike	1	0.2	26.4	26.40	10.5
Brook silverside	Common				
Total (13 Species)	556			250.28	

*Common names of fishes recognized by the American Fisheries Society.

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	20	9.4	0.01	1	19.5				
2.0	14	6.6	0.01	1	20.0				
2.5	19	9.0	0.02	1,2	20.5				
3.0	36	17.0	0.02	2	21.0				
3.5	23	10.8	0.04	2,3	21.5				
4.0	16	7.5	0.05	3	22.0				
4.5	9	4.2	0.08	3	22.5				
5.0	6	2.8	0.10	3,4	23.0				
5.5	8	3.8	0.14	3,4	23.5				
6.0	6	2.8	0.18	4	24.0				
6.5	2	0.9	0.21	4,5	24.5				
7.0	6	2.8	0.28	4,6,7	25.0				
7.5	10	4.7	0.36	6,7,9	25.5				
8.0	26	12.3	0.42	6,7,9	26.0				
8.5	11	5.2	0.50	7,8,9	TOTAL	212			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	154 /hr	GILL NET CATCH	1 /lift	TRAP NET CATCH	18 /lift

AGE-LENGTH KEY FOR BLUEGILL														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5	20	2	20											
2.0	14	5	14											
2.5	19	5	8	11										
3.0	36	5		36										
3.5	23	5		5	18									
4.0	16	5			16									
4.5	9	4			9									
5.0	6	5			1	5								
5.5	8	5			2	6								
6.0	6	4				6								
6.5	2	2				1	1							
7.0	6	4				2		3	2					
7.5	10	5						4	4		2			
8.0	26	5						5	16		5			
8.5	11	5							7	2	2			
Total	212	66	42	52	46	20	1	12	29	2	9			
Mean TL			2.1	3.2	4.2	5.9	6.8	7.8	8.2	8.8	8.3			
SE			0.06	0.04	0.07	0.13		0.12	0.07		0.12			

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0	2	2.3	0.02	1	21.0				
3.5	1	1.2	0.03	1	21.5				
4.0	3	3.5	0.04	1	22.0				
4.5	1	1.2	0.05	1	22.5				
5.0	1	1.2	0.06	1	23.0				
5.5					23.5				
6.0	2	2.3	0.12	2	24.0				
6.5					24.5				
7.0	1	1.2	0.20	2	25.0				
7.5	3	3.5	0.22	2,3	25.5				
8.0	4	4.7	0.28	2,3,4	26.0				
8.5	2	2.3	0.33	3,4	TOTAL	86			
9.0	5	5.8	0.38	3,4					
9.5	9	10.5	0.45	3,4					
10.0	12	14.0	0.53	3,4					
10.5	14	16.3	0.61	4,5					
11.0	12	14.0	0.69	4,5					
11.5	10	11.6	0.78	4,5,6					
12.0	2	2.3	0.94	4,5					
12.5	1	1.2	1.02	5					
13.0									
13.5									
14.0									
14.5									
15.0	1	1.2	1.80	7					
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	75 /hr	GILL NET CATCH	2 /lift	TRAP NET CATCH	0 /lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS (Spring EF)									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0	1	0.1		
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0	2	0.2			22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0	5	0.6			25.0				
7.5	4	0.5			25.5				
8.0	11	1.3			26.0				
8.5	15	1.8			TOTAL	821			
9.0	45	5.5							
9.5	59	7.2							
10.0	120	14.6							
10.5	133	16.2							
11.0	129	15.7							
11.5	108	13.2							
12.0	92	11.2							
12.5	41	5.0							
13.0	20	2.4							
13.5	15	1.8							
14.0	6	0.7							
14.5	3	0.4							
15.0	2	0.2							
15.5	4	0.5							
16.0	2	0.2							
16.5	1	0.1							
17.0	2	0.2							
17.5									
18.0									
18.5	1	0.1							

ELECTROFISHING CATCH	124 /hr	GILL NET CATCH	/lift	TRAP NET CATCH	/lift

AGE-LENGTH KEY FOR LARGEMOUTH BASS (Spring)														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
4.0	2	2	2											
4.5														
5.0														
5.5														
6.0														
6.5														
7.0	5	4		5										
7.5	4	4		2	2									
8.0	11	9		2	8	1								
8.5	15	9			13	2								
9.0	45	10			22	23								
9.5	59	10			12	47								
10.0	120	7			34	86								
10.5	133	9				118	15							
11.0	129	8				48	81							
11.5	108	10				11	75	22						
12.0	92	9				10	82							
12.5	41	11				15	22	4						
13.0	20	9					2	11	7					
13.5	15	6					3	7	5					
14.0	6	2					3	3						
14.5	3	2						1	2					
15.0	2	2								2				
15.5	4	1							4					
16.0	2	2								1	1			
16.5	1	1							1					
17.0	2													
17.5														
18.0														
18.5	1													
19.0	1													
Total	821	127	2	9	91	361	282	47	19	3	1			
Mean TL			4.3	7.6	9.5	10.6	11.8	12.7	14.3	15.6	16.3			
SE				0.15	0.08	0.04	0.04	0.14	0.27	0.33				

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF REDEAR									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5	2	3.4	0.04	2	21.5				
4.0	2	3.4	0.05	2	22.0				
4.5	2	3.4	0.08	2	22.5				
5.0					23.0				
5.5	1	1.7	0.15	4	23.5				
6.0	1	1.7	0.16	5	24.0				
6.5	1	1.7	0.22	4	24.5				
7.0	3	5.2	0.29	4,5	25.0				
7.5	3	5.2	0.33	6,7	25.5				
8.0	19	32.8	0.40	5,6,7,8	26.0				
8.5	17	29.3	0.48	7,8,9	TOTAL	58			
9.0	6	10.3	0.55	7,8					
9.5	1	1.7	0.66	7					
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	14 /hr	GILL NET CATCH	0 /lift	TRAP NET CATCH	14 /lift

AGE-LENGTH KEY FOR REDEAR														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0														
3.5	2	2		2										
4.0	2	2		2										
4.5	2	2		2										
5.0														
5.5	1	1				1								
6.0	1	1					1							
6.5	1	1				1								
7.0	3	3				2	1							
7.5	3	3						2	1					
8.0	19	5					4	4	7	4				
8.5	17	6							8	6	3			
9.0	6	2							3	3				
9.5	1	1							1					
Total	58	29		6		4	6	6	20	13	3			
Mean TL				4.3		6.8	7.7	8.1	8.6	8.7	8.8			
SE				0.18		0.35	0.35	0.11	0.10	0.11				

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF YELLOW PERCH									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	2	3.5	0.01	1	20.5				
3.0	21	36.8	0.01	1	21.0				
3.5	2	3.5	0.02	1	21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0	8	14.0	0.11	2	24.0				
6.5	6	10.5	0.14	2	24.5				
7.0	6	10.5	0.18	2	25.0				
7.5	1	1.8	0.22	3	25.5				
8.0	3	5.3	0.28	2,3	26.0				
8.5	5	8.8	0.32	3,4	TOTAL	57			
9.0	2	3.5	0.41	4,5					
9.5									
10.0	1	1.8	0.52	6					
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	34 /hr	GILL NET CATCH	3 /lift	TRAP NET CATCH	1 /lift

AGE-LENGTH KEY FOR YELLOW PERCH														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5	2	2	2											
3.0	21	6	21											
3.5	2	2	2											
4.0														
4.5														
5.0														
5.5														
6.0	8	4		8										
6.5	6	4		6										
7.0	6	4		6										
7.5	1	1			1									
8.0	3	3		1	2									
8.5	5	4			1	4								
9.0	2	2				1	1							
9.5														
10.0	1	1						1						
Total	57	33	25	21	4	5	1	1						
Mean TL			3.3	6.8	8.3	8.9	9.3	10.3						
SE			0.04	0.12	0.20	0.11								

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF WALLEYE									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5					TOTAL	29			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0	7	24.1	0.60	2					
12.5	2	6.9	0.65	2					
13.0	2	6.9	0.75	3					
13.5	2	6.9	0.87	2,3					
14.0	2	6.9	0.97	2,3					
14.5	2	6.9	1.02	3					
15.0	2	6.9	1.15	2,3					
15.5	5	17.2	1.26	3					
16.0	1	3.4	1.37	3					
16.5									
17.0									
17.5	1	3.4	1.80	4					
18.0	2	6.9	2.04	4					
18.5	1	3.4	2.23	4					

ELECTROFISHING CATCH	12 /hr	GILL NET CATCH	2 /lift	TRAP NET CATCH	1 /lift

AGE-LENGTH KEY FOR WALLEYE														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
12.0	7	7		7										
12.5	2	2		2										
13.0	2	2			2									
13.5	2	2		1	1									
14.0	2	2		1	1									
14.5	2	2			2									
15.0	2	2		1	1									
15.5	5	5			5									
16.0	1	1			1									
16.5														
17.0														
17.5	1	1				1								
18.0	2	2				2								
18.5	1	1				1								
Total	29	29		12	13	4								
Mean TL				12.9	14.9	18.3								
SE				0.29	0.29	0.20								

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Bluegill				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8	2008	7	2.0 - 2.6	1.8							
	2007	9	2.7 - 3.6	1.5	2.4						
	2006	16	3.5 - 5.6	1.5	2.4	3.6					
	2005	13	5.0 - 7.2	1.4	2.3	3.6	5.1				
	2004	1*	6.5	1.3	1.9	2.8	4.7	5.8			
	2003	5	7.1 - 8.3	1.4	2.2	3.0	4.7	6.5	7.2		
	2002	9	7.4 - 8.9	1.3	1.9	2.6	3.6	5.1	6.8	7.7	
	2001	1*	8.6	1.5	2.0	3.0	4.5	5.6	6.6	7.4	8.2
	AVERAGE LENGTH			1.5	2.2	3.3	4.4	5.5	6.8	7.6	8.2
	NUMBER AGED			61	54	45	29	16	15	10	1

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Largemouth bass				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8	2008	2*	4.0 - 4.1	2.8							
	2007	10	6.8 - 8.3	2.8	7.1						
	2006	26	7.9 - 10.4	3.0	5.9	8.5					
	2005	32	8.1 - 12.2	3.2	6.0	8.3	9.9				
	2004	29	10.9 - 14.2	3.2	6.0	8.5	10.4	11.8			
	2003	17	11.7 - 14.5	2.9	5.8	8.5	10.4	11.8	12.8		
	2002	9	12.9 - 16.8	2.7	5.4	8.1	10.3	11.9	13.0	14.0	
	2001	3	15.0 - 16.1	3.4	5.5	8.4	10.6	12.1	13.3	14.3	15.2
	AVERAGE LENGTH			3.0	6.0	8.4	10.2	11.8	12.9	14.1	15.2
	NUMBER AGED			128	126	116	90	58	29	12	4

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Redear				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.6											
	2007	6		1.6	3.4						
	2005	4		1.4	2.4	4.0	6.2				
	2004	3		1.3	2.1	3.4	5.2	6.8			
	2003	5		1.3	2.0	3.3	4.4	6.5	7.9		
	2002	6		1.4	2.2	3.4	4.6	5.9	7.3	8.2	
	2001	4		1.3	2.1	3.2	4.2	5.4	6.7	8.0	8.5
	AVERAGE LENGTH			1.4	2.4	3.4	4.8	6.1	7.3	8.1	8.5
	NUMBER AGED			28	28	22	22	18	15	10	4

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Yellow perch				I	II	III	IV	V	VI	VII	VIII
Intercept = 1.2	2008	10	2.8 - 3.8	2.4							
	2007	13	6.0 - 8.0	3.1	5.6						
	2006	4	7.6 - 8.7	2.8	5.3	7.3					
	2005	4	8.5 - 9.2	2.7	4.3	6.5	8.2				
	2004	1*	9.3	2.6	4.5	6.3	8.2	9.0			
	2003	1*	10.0	2.6	4.3	6.0	7.5	8.5	9.1		
	AVERAGE LENGTH			2.8	5.3	6.9	8.2				
	NUMBER AGED			33	23	10	6	2	1		

*Not included in average length calculations.

GPS SAMPLING COORDINATES												
GILL NETS					TRAP NETS					ELECTROFISHING		
1	N	41.72608	W	85.20407	1	N	41.72683	W	85.20747	1	N	W
	N		W		2	N	41.73047	W	85.20037		N	W
2	N	41.73078	W	85.20000	3	N	41.73024	W	85.19725	2	N	W
	N		W		4	N		W			N	W
3	N	41.73003	W	85.20179	5	N		W		3	N	W
	N		W		6	N		W			N	W
4	N	41.72697	W	85.20693	7	N		W		4	N	W
	N		W		8	N		W			N	W
5	N	41.73044	W	85.19766	9	N		W		5	N	W
	N		W		10	N		W			N	W
6	N	41.73035	W	85.20399	11	N		W		6	N	W
	N		W		12	N		W			N	W
7	N		W		13	N		W		7	N	W
	N		W		14	N		W			N	W
8	N		W		15	N		W		8	N	W
	N		W		16	N		W			N	W
9	N		W		17	N		W		9	N	W
	N		W		18	N		W			N	W
10	N		W		19	N		W		10	N	W
	N		W		20	N		W			N	W
11	N		W							11	N	W
	N		W								N	W
12	N		W							12	N	W
	N		W								N	W
13	N		W							13	N	W
	N		W								N	W
14	N		W							14	N	W
	N		W								N	W
15	N		W							15	N	W
	N		W								N	W
16	N		W							16	N	W
	N		W								N	W
17	N		W							17	N	W
	N		W								N	W
18	N		W							18	N	W
	N		W								N	W
19	N		W							19	N	W
	N		W								N	W
20	N		W							20	N	W
	N		W								N	W

OCCURRENCE AND ABUNDANCE OF SUBMERSED AQUATIC PLANTS

County:	Steuben	Total Sites:	50	Mean species/site:	2.04
Date:	7/30/2009	Sites with plants:	46	SE Mean species/site:	0.17
Secchi (ft):	12.0	Sites with native plants:	46	Mean native species/site:	2.04
Maximum Plant Depth (ft):	18.0	Number of species:	14	SE Mean natives/site:	0.17
Trophic Status:	M	Number of native species:	13	Species diversity:	0.81
		Maximum species/site:	5	Native species diversity:	0.81

	Frequency of	Rake score frequency per species				Plant
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Chara	68.0	32.0	14.0	34.0	20.0	43.2
Slender naiad	40.0	60.0	38.0	2.0	0.0	8.8
Elodea	32.0	68.0	32.0	0.0	0.0	6.4
Eel grass	22.0	78.0	20.0	2.0	0.0	5.2
Sago pondweed	8.0	92.0	6.0	2.0	0.0	2.4
Coontail	6.0	94.0	6.0	0.0	0.0	1.2
Illinois pondweed	6.0	94.0	4.0	2.0	0.0	2.0
Nitella	6.0	94.0	4.0	2.0	0.0	2.0
Curly-leaf pondweed	4.0	96.0	4.0	0.0	0.0	0.8
Spiny naiad	4.0	96.0	4.0	0.0	0.0	0.8
Northern watermilfoil	2.0	98.0	2.0	0.0	0.0	0.4
Small pondweed	2.0	98.0	2.0	0.0	0.0	0.4
Variable pondweed	2.0	98.0	2.0	0.0	0.0	0.4
Water stargrass	2.0	98.0	2.0	0.0	0.0	0.4

Other species observed: cattail, pickerelweed, spatterdock, spikerush, three-square rush, white waterlily.